ON THE MORPHOLOGY, ADVERTISING CALL AND HABITAT OF THE BUSH FROG *PHILAUTUS LEUCORHINUS* (LICHTENSTEIN AND MARTENS, 1856)[1]

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(*With a text-figure*)

Key words: *Philautus leucorhinus*, morphometry, call sequence, habitat

The information on the morphometry and ecology of the Bush frog *Philautus leucorhinus* (Lichtenstein and Martens, 1856) is meagre. The species was studied for their mating call and the habitat, in Goa during the monsoon in 1989. A total of 24 individuals were collected to study morphometry. Statistical relationship between different morphometric parameters was analysed. There was significant positive correlation between Snout-Vent length and Tibia length. The time taken for call sequence was also analysed. The individuals of the Bush frog used various microhabitats of shrubs while making their mating call.

INTRODUCTION

The genus *Philautus* (Family Rhacophoridae: Amphibia) comprises of small robust frogs which are usually 2-3 cm in snout-vent length. Species of this genus live in shrubs and low vegetation in tropical rain forest, sometimes quite far from water (Liem 1970). They appear only in the monsoon season. Due to their elusiveness information on their morphometry and ecology is meagre. Some Indian species of this genus have been described by Boulenger (1890) and Inger *et al.* (1984) with very little morphometric details. McCann (1932) provided some details on the call and habitat of species *Philautus bombayensis*. However, the literature on this group is negligible. In 1989 about 24 adult males of *Philautus leucorhinus* were collected from Goa forests (Volpoi-15, Molem-6 and Canacona-3) during the monsoon. This species has been recorded in India from Goa, Karnataka and Kerala states along the Western Ghats (Sekar 1991). This paper describes the morphology, statistical relationship between the morphometric parameters, advertising call and habitat of the bush frog *Philautus leucorhinus*.

MATERIALS AND METHODS

The frogs were collected from shrubs when they were making advertising call at night. They were preserved in 10% formalin. About 24 adult males were preserved. The call was recorded with the help of a micro cassette recorder. To measure the morphometric characters a dial vernier (least count 0.05 mm) was used. Some of the morphometric variables were compared with each other. Statistical analysis such as correlation coefficient (r) and regression equation (Y=mX + C) were done.

RESULTS

Morphology: (a) *Diagnosis:* Small sized frog; adult male measured up to 29.45 mm in snout to vent length, average 26.96 mm (Table 1). Snout pointed projecting beyond the mouth. Nostrils nearer to tip of the snout than the eye. Tympanum distinct, almost half the diameter of the eye. Interorbital space broader than the width of upper eyelid. First finger shorter than second; fingers with a slight rudiment of web. Toes 2/3

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TABLE 1
THE MEASUREMENTS (IN MM) OF 24 ADULT MALES OF *Philautus leucorhinus* COLLECTED FROM GOA

Measurements	Range	Mean	S.D. ±	Ratio of measurement to SV length (%)
Snout-Vent length	24.30-29.45	26.96	1.18	-
Head length	8.30-10.85	9.29	0.52	34.45
Head width	9.50-11.40	10.13	0.49	37.56
Internasal space	2.30-3.10	2.69	0.23	9.97
Interorbital space	2.90-3.80	3.48	0.27	12.90
Width of upper eyelid	2.30-3.20	2.62	0.19	9.71
Diameter of eye	3.25-4.00	3.63	0.21	13.46
Tympanum	1.60-2.10	1.92	0.16	7.12
Arm length	11.40-16.40	14.24	0.93	52.80
Diameter of lower arm	2.40-3.05	2.68	0.22	9.94
Hand length	7.70-9.60	8.54	0.40	31.66
Leg length	37.30-47.00	40.63	2.12	150.65
Tibia length	11.90-15.25	13.07	0.74	48.50
Length of foot & tarsus	12.40-19.95	17.36	1.38	64.37
Foot length	10.00-12.25	11.12	0.55	41.23
Inner metatarsal tubercle	0.80-1.10	0.98	0.07	3.63
Width of toe-pad	1.30-1.80	1.57	0.13	5.82
First finger length	2.00-3.10	2.56	0.27	9,49
Second finger length	3.25-3.95	3.58	0.20	13.27

webbed. Tips of fingers and toes dilated into disc; the disc with circum-marginal groove. Tibio-tarsal articulation reaches tympanum or posterior border of the eye. Heels touch each other when legs are folded at right angles to the body. Sub-articular tubercles of fingers and toes moderate. Inner metatarsal tubercle small and prominent.

Skin smooth above; a raised median line from the tip of the snout to the vent; belly, under side of thigh and around vent granular; a fold from the eye to the shoulder.

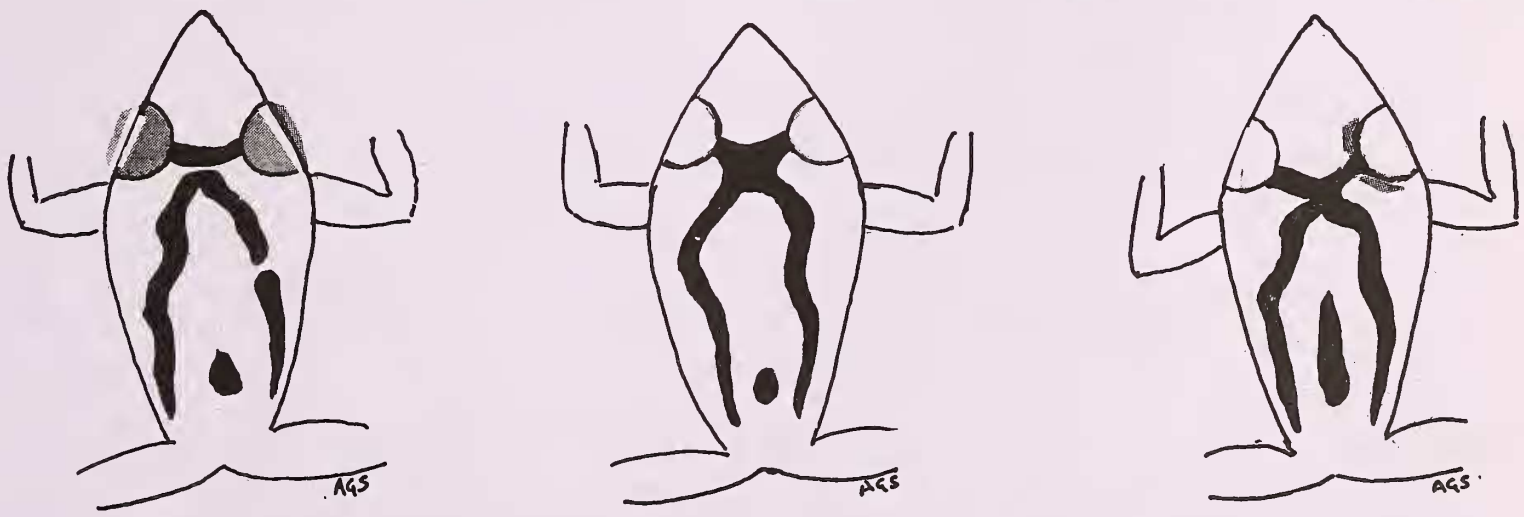

Fig. 1. Dorsal side of *Philautus leucorhinus* with different markings.

(b) *Colour:* The upper surface was light brown. A dark band below the canthus rostralis

and on the temporal region. The upper eyelids and the interorbital width darker than the body. An arch, one on each side of the back, joined at interorbital width varies in the pattern (Fig. 1). Arms in forelimbs, femur and thighs in hindlimbs are barred. Throat dotted with brown.

(c) *Morphometric relationship:* Morphometric measurements such as snout-vent length (SV length), tibia length, head length, foot length, diameter of eye, diameter of tympanum, head width and interorbital space were taken and the relationships between these parameters were analysed statistically. Results of analysis (Table 2) indicated that there was significant positive correlation between SV length and Tibia length ($r=0.8$, $P<0.001$), Tibia length and foot length ($r=0.728$, $P<0.001$) and diameter of eye and diameter of tympanum ($r=0.59$, $P<0.01$) whereas the positive correlation between head length and foot length, and SV length and head length are not significant at $P<0.1$ level.

Advertising call: The advertising or breeding call of this species was recorded and studied. The frogs occupied different parts of the shrubs from which they relayed their call. They sat on the stems, branches and leaves in various positions, including the snout towards land and sticking upside down on the back of the leaves. Some of them were located inside curled dry leaves and also small cavities in the stems. Males have a single vocal sac which was like a bubble when it was fully inflated. Though the call is usually heard in chorus, the call of individuals was also recorded.

TABLE 2
STATISTICAL RELATIONSHIP BETWEEN DIFFERENT MORPHOMETRIC PARAMETERS IN *Philautus leucorhinus* (N=24, df=2)

Morphometric parameters	r value	t value	Significance	Regression equation
SV length (X) with Tibia length (Y)	0.80	6.25	P 0.001	Y=0.5X-0.1
Tibia length (X) with foot length (Y)	0.728	4.9771	P 0.001	Y=0.98X-1.68
Diameter of eye (X) with diameter of Tympanum (Y)	0.59	3.4161	P 0.01	Y=0.45X+0.29
Head width (X) with interorbital space (Y)	0.457	2.4109	P 0.05	Y=0.25X+0.95
Head length (X) with foot length (Y)	0.39	1.9881	P 0.1*	Y=0.4X+7.1
SV length (X) with Head length (Y)	0.37	1.8861	P 0.1*	Y=0.16X+4.98

* Not significant

The call can be syllabilized as *'trek....trek....trek...trekkkktak tak tak'*. This makes one call sequence. To find out the average time taken for a call sequence, 10 sequences were observed. The time ranged from 8.64 to 43.74 seconds. On an average, each call sequence lasts for 21.41 seconds (Table 3). The duration of the sequence was dependent on number of *'trek'* made by the frog during the call. The frog remained silent after it vocalised each *'trek'*. The time interval between the two *'trek'* calls was calculated from 25

TABLE 3
DATA ON THE TIME (IN SECONDS) TAKEN FOR A CALL SEQUENCE (N=10) AND TIME INTERVAL BETWEEN TWO *'TREK'* IN A SEQUENCE (N=25)

Call	Range	Mean	S.D. ±
Time taken for call sequence	8.64-43.74	21.41	8.79
Time interval between two *'treks'* in a sequence	2.33-5.39	3.62	0.82

observations.The frog remained silent for 3.62 seconds on an average after each '*trek*' in the sequence. They were very wary of intruders. They stop calling even at the slightest movement or disturbance.

Habitat: All the frogs were collected from shrubs of 2-3 m height in the moist deciduous forests and also in non-forested areas with shrubs. They were seen sitting on stem, branches on and under the leaves. No specimen was seen on the ground. They were collected far from the water. All frogs were caught guided by their call, so there was no female in the collection.

Discussion

The adult male frogs averaged 26.96 mm in snout-vent length. Boulenger (1890) recorded the length as 33 mm (1.3 inches) and Kirtisinghe (1957) has recorded it as 31 mm from specimens collected in Sri Lanka. But none of them mentioned the sex of the frog. The female may be a little larger in size than the male. Inger *et al.* (1984) have recorded the females as bigger than the males in all *Philautus* species collected by them at Ponmudi. The relationship between the different morphological measurements of *Philautus leucorhinus* was found to be positive especially the SV length and tibia length. Tibia length and foot length shows a high positive correlation.

The pattern of the call is totally different from that of its related species *Philautus bombayensis* which can be syllabilised a '*tik tik tik*'. The observation on the frogs calling sitting in face down position is supported by McCann's (1932) observation on *Philautus bombayensis*. He described that being a tree frog this species generally rests on the bark of trees and bush in facing down position. In this position the large vocal sac is inflated to its maximum. All frogs were picked up from shrubs and none from the ground. Inger *et al.* (1984) have described the habitat of some related species *P. charius, P. femoralis, P. signatus* and *P. temporalis*. Among these species only *P. femoralis* was collected only from shrubs, the specimens of other species were collected from various microhabitats such as shrubs, on the surface of dead leaves on the ground, beneath logs, on the bare soil surface and on rocks. Though the frogs were seen calling, their breeding behaviour and egg laying behaviour are yet to be studied.

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